

CLAIMS

1. A liquid crystal display device comprising:

a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between the pair of substrates;

first and second polarizers arranged on either side of the liquid crystal cell;

a first retardation plate arranged between the liquid crystal cell and the first polarizer;

a second retardation plate arranged between the liquid crystal cell and the second polarizer;

each of the first and second retardation plates having an optical axis in a plane parallel to the surfaces of the substrates and a retardation of substantially $\lambda/4$, the optical axis of the first retardation plate being perpendicular to the optical axis of the second retardation plate;

the first and second polarizers having polarizing axes arranged at an angle of 45° with respect to the optical axes of the first and second retardation plates; and

the liquid crystal cell being arranged such that a state of alignment of the liquid crystal molecules changes, accompanying change in a polar angle and/or change in an azimuth upon application of voltage.

2. A liquid crystal display device comprising:

a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between the pair of substrates;

first and second polarizers arranged on either side of the liquid crystal cell;

a first retardation plate arranged between the liquid crystal cell and the first polarizer;

a second retardation plate arranged between the liquid crystal cell and the second polarizer;

each of the first and second retardation plates having an optical axis in a plane parallel to the

surfaces of the substrates and a retardation of substantially $\lambda/4$, the optical axis of the first retardation plate being perpendicular to the optical axis of the second retardation plate;

5 the first and second polarizers having polarizing axes arranged at an angle of 45° with respect to the optical axes of the first and second retardation plates; and

10 the liquid crystal cell being arranged such that an azimuth distribution exists in a state of alignment of the liquid crystal molecules when the liquid crystal molecules are aligned horizontally or obliquely with respect to the surfaces of the substrates.

15 3. A liquid crystal display device according to claim 1 or 2, wherein at least a portion of the liquid crystal molecules are aligned in the azimuth except for 45° from the polarizing axes of the polarizers.

20 4. A liquid crystal display device according to claim 1 or 2, wherein the liquid crystal of the liquid crystal cell is of a vertical alignment type, the liquid crystal cell includes a structure or a slit arranged on the electrode of at least one of the substrates, and a state of alignment of the liquid crystal molecules located on one side of the structure or the slit is
25 different from a state of alignment of the liquid crystal molecules located on the other side of the structure or slit.

30 5. A liquid crystal display device according to claim 4, wherein liquid crystal molecules located on the structure or slit are aligned, accompanying a change in the azimuth upon application of voltage.

35 6. A liquid crystal display device comprising:
 a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between the pair of substrates;

 first and second polarizers arranged on either side of the liquid crystal cell;

a first retardation plate arranged between the liquid crystal cell and the first polarizer;

a second retardation plate arranged between the liquid crystal cell and the second polarizer;

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each of the first and second retardation plates having an optical axis in a plane parallel to the surfaces of the substrates and a retardation of substantially $\lambda/4$, the optical axis of the first retardation plate being perpendicular to the optical axis of the second retardation plate;

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the first and second polarizers having polarizing axes arranged at an angle of 45° with respect to the optical axes of the first and second retardation plates;

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the liquid crystal of the liquid crystal cell being of a vertical alignment type, the liquid crystal cell including structures or slits arranged on or in an electrode of at least one of the substrates, a state of alignment of the liquid crystal molecules located on one side of the structure or the slit being different from a state of alignment of the liquid crystal molecules located on the other side of the structure or the slit; and

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at least one of the pair of substrates having electrically conductive linear structures.

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7. A liquid crystal display device comprising:

a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between the pair of substrates;

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first and second polarizers arranged on either side of the liquid crystal cell;

a first retardation plate arranged between the liquid crystal cell and the first polarizer;

a second retardation plate arranged between the liquid crystal cell and the second polarizer;

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each of the first and second retardation plates having an optical axis in a plane parallel to the

surfaces of the substrates and a retardation of substantially $\lambda/4$, the optical axis of the first retardation plate being perpendicular to the optical axis of the second retardation plate;

5 the first and second polarizers having polarizing axes arranged at an angle of 45° with respect to the optical axes of the first and second retardation plates;

10 the liquid crystal of the liquid crystal cell being of a vertical alignment type, the liquid crystal cell including structures or slits arranged on or in an electrode of at least one of the substrates, a state of alignment of the liquid crystal molecules located on one side of the structure or the slit being
15 different from a state of alignment of the liquid crystal molecules located on the other side of the structure or the slit; and

20 a retardation in the plane of the retardation plate being not less than 120 nm and not more than 160 nm.

8. A liquid crystal display device according to claim 7, wherein an angle between the absorbing axis of the polarizer and the aligning direction or the inclining direction of liquid crystal molecules is not less than
25 5° , and the contrast characteristic is symmetrical with respect to the horizontal direction.

9. A liquid crystal display device according to claim 7, wherein at least one optical layer having a negative retardation is arranged between the retardation
30 plate and the liquid crystal cell or between the retardation plate and the polarizer.

10. A liquid crystal display device comprising:
 a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between
35 the pair of substrates;

 a film causing light to scatter in a specific direction; and

the liquid crystal of the liquid crystal cell being of a vertical alignment type, the liquid crystal cell including structures or slits arranged on or in an electrode of at least one of the substrates, a state of alignment of the liquid crystal molecules located on one side of the structure or the slit being different from a state of alignment of the liquid crystal molecules located on the other side of the structure or the slit.

11. A liquid crystal display device according to claim 10, further comprising a uniaxial stretched film, a biaxial stretched film and a film having a negative retardation so that the viewing angle characteristic of the liquid crystal display can be improved.

12. A liquid crystal display device comprising:
a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between the pair of substrates;

first and second polarizers arranged on either side of the liquid crystal cell;

a first retardation plate arranged between the liquid crystal cell and the first polarizer;

a second retardation plate arranged between the liquid crystal cell and the second polarizer;

each of the first and second retardation plates having an optical axis in a plane parallel to the surfaces of the substrates and a retardation of substantially $\lambda/4$, the optical axis of the first retardation plate being perpendicular to the optical axis of the second retardation plate;

the first and second polarizers having polarizing axes arranged at an angle of 45° with respect to the optical axes of the first and second retardation plates; and

the liquid crystal layer of the liquid crystal cell containing the liquid crystal and a resin coexisting with the liquid crystal.

13. A liquid crystal display device comprising:

a liquid crystal cell comprising a pair of substrates and a liquid crystal layer arranged between the pair of substrates;

5 first and second polarizers arranged on either side of the liquid crystal cell;

a first retardation plate arranged between the liquid crystal cell and the first polarizer;

10 a second retardation plate arranged between the liquid crystal cell and the second polarizer;

each of the first and second retardation plates having an optical axis in a plane parallel to the surfaces of the substrates and a retardation of substantially $\lambda/4$, the optical axis of the first
15 retardation plate being perpendicular to the optical axis of the second retardation plate;

the first and second polarizers having polarizing axes arranged at an angle of 45° with respect to the optical axes of the first and second retardation
20 plates;

the liquid crystal of the liquid crystal cell being of a vertical alignment type, a polymer network being formed in the liquid crystal layer of the liquid crystal cell, the pretilt of the liquid crystal
25 molecules and an inclination direction of the liquid crystal molecules upon application of voltage being regulated by the polymer network.